

See "Instructions for Filling out the Work Permit" contained in the Work Planning and Control for Experiments and Operations Subject Area.

1. Work request WCC fills out this section.
☐ Standing Work Permit

Requester: Don Lynch	Date: 1/24/2013	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 1/25/2013	Est. End Date: 2/11/2013
Brief Description of Work: Upgrade West Carriage Window Washer platform with autospool and remote safety pin insertion/removal			
Building: 1008	Room: IR	Equipment: West Carriage "window washer" platforms	Service Provider: Carpenters and PHENIX Technicians

2. WCC, Requester/Designee, Service Provider, and ESS&H (as necessary) fill out this section or attach analysis

ESS&H ANALYSIS			
Radiation Concerns	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne
	<input type="checkbox"/> Contamination	<input type="checkbox"/> Radiation	<input type="checkbox"/> NORM
	<input type="checkbox"/> Other		
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			
<input type="checkbox"/> Fissionable/Radiological materials involved, notify Laboratory Nuclear Safety Officer			
Radiation Generating Devices:	<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges
	<input type="checkbox"/> X-ray Equipment		
Safety and Security Concerns	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Explosives	<input type="checkbox"/> Transport of Haz/Rad Material
	<input type="checkbox"/> Pressurized Systems		
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input type="checkbox"/> Critical Lift	<input type="checkbox"/> Fumes/Mist/Dust*	<input type="checkbox"/> Magnetic Fields*
<input type="checkbox"/> Railroad Work	<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Heat/Cold Stress
<input type="checkbox"/> Rigging	<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Hydraulic
<input type="checkbox"/> Noise*	<input type="checkbox"/> Biohazard*	<input type="checkbox"/> Elevated Work	<input type="checkbox"/> Lasers*
<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Chemicals/Corrosives*	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lead*
<input type="checkbox"/> Oxygen Deficiency*	<input type="checkbox"/> Confined Space*	<input type="checkbox"/> Ergonomics*	<input type="checkbox"/> Material Handling
<input type="checkbox"/> Penetrating Fire Walls	<input type="checkbox"/> Safety Health Rep. Review Required		
<input type="checkbox"/> Vacuum	<input type="checkbox"/> Haz, Rad, Bio Material Exceed DOE 151.1-C Levels - Contact OEM		
<input type="checkbox"/> Other			
Environmental Concerns			
<input type="checkbox"/> None		<input type="checkbox"/> Work impacts Environmental Permit No.	
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use Institutional Controls	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping
Waste disposition by: <input type="checkbox"/> Other			
Pollution Prevention (P2)/Waste Minimization Opportunity:		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
FACILITY CONCERNS			
<input checked="" type="checkbox"/> None		<input type="checkbox"/> Intermittent Energy Release	
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm	<input type="checkbox"/> Vibrations
	<input type="checkbox"/> Impacts Facility Use Agreement	<input type="checkbox"/> Temperature Change	<input type="checkbox"/> Other
<input type="checkbox"/> Configuration Management	<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions	
WORK CONTROLS			
Work Practices			
<input type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment
	<input type="checkbox"/> Security (see Instruction Sheet)		
<input checked="" type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation
<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection
<input type="checkbox"/> Warning Alarm (i.e. "high level")	<input type="checkbox"/> Electrical Inspection Required		
Personal Protective Equipment			
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input checked="" type="checkbox"/> Gloves as appropriate	<input type="checkbox"/> Lab Coat
	<input checked="" type="checkbox"/> Safety Glasses as appropriate		
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator*
	<input type="checkbox"/> Safety Harness		
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers
<input checked="" type="checkbox"/> Safety Shoes	<input type="checkbox"/> High visibility cloths/vest	<input type="checkbox"/> Other	
Permits Required (Permits must be valid when job is scheduled.)			
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems	
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No	
<input type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other	
Dosimetry/Monitoring			
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input type="checkbox"/> TLD
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O ₂ /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input type="checkbox"/> Other
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump	
Training Requirements (List specific training requirements)			
C-A User or equiv. , PHENIX Awareness			
Based on analysis above, the Review Team determines the risk, complexity, and coordination ratings below:		If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)	
ESS&H Risk Level:	<input checked="" type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High	WCC: Don Lynch	Date:
Complexity Level:	<input checked="" type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High	Service Provider:	Date:
Work Coordination:	<input checked="" type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High	Authorization to start Don Lynch	Date:
(Department/Division, or their equivalent, Sup/WCC/Designee)			

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, scheduling, coordination, notifications, and personnel availability need to be addressed in adequate detail): See Attached

Special Working Conditions Required (e.g., Industrial Hygiene hold points or other monitoring)

None

Notifications to operations and Operational Limits Requirements: None

Post Work Testing, Notification or Documentation Required:

Job Safety Analysis Required: ☐ Yes ☒ No

Review Done: ☒ in series ☐ team

Reviewed by: * Primary Reviewer signature means that the Review Team members were appropriate for the work that was planned, the Team visited the job site, hazards and risks that could impact ESS&H have been considered and controls established according to BNL requirements. In addition, this signature indicates that applicable JRAs, FRAs, as well as other planning documents have been reviewed and training requirements have been identified and recorded on this permit.

Title	Name (print)	Signature	Life #	Date
ES&H Professional				
F&O Facility Project Manager				
Service Provider				
Work Control Coordinator	Don Lynch		20146	
Safety Health Representative				
Research Space Manager				
Other				
Other (PHENIX Escort)				
Required Walkdown Completed				
*Primary Reviewer				

4. Job site personnel (Supervisor and workers) fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments) and all training required for this permit is current/complete. Job Supervisor/Contractor Supervisor signatures also includes verification that worker training required for this permit is current/complete.

Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:

Workers are encouraged to provide feedback on ESS&H concerns or on ideas for improved job work flow. Use feedback form or space below.

5. Department/Division, or their equivalent, Line Manager or Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name:	Signature:	Life#:	Date:
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6. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)

a) WCM/WCC: Are there any changes as a result of worker feedback? ☐ Yes ☐ No

Note: See Work Planning and Control for Experiments and Operations Subject Area section 2.6.

7. Post Job Review/Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of job site to work supervisor.) The WCC ensures that the change process to update drawings, placards, postings, procedures, etc., is initiated, if necessary.

Name:	Signature:	Life#:	Date:
Comments:			

West Carriage Window Washer Platform Upgrade: Autospool and Remote pin Insertion/Removal**INTRODUCTION**

In order to accommodate the ability to move the PHENIX detector West Carriage (WC) east and west for maintenance and access, the platforms on the west side of the EC need to be moved out of the way when the WC is moved to the west position. This is accomplished by lifting the platforms up above the WC with a winch. The platforms are supported by cantilever brackets in steel raceways, near the north and south ends of the platforms. Inside the raceways are permanent pin stops which the platform support brackets rest when lowered as required. The winch cable is attached to the lowermost platform when the cable is retracted the lowest platform lifts off its stops and rises until it is below the 2nd lowest platform which then sits on the lowest platform and then they rise together as the winch cable is further retracted. This is repeated for the remaining platforms until the winch has hauled the lowest platform and all platforms above it to a point high enough that the platforms no longer prevent the WC from moving to its most western position. At that point two pins are manually inserted below the lowest platform and at the north and south rails for the lowest platform such that they would prevent the platforms from falling should the winch cable fail. This system is known as the “window washer” platforms at PHENIX due to its similarity to window washing platforms on high rise buildings.

There are 2 recognized safety problems with the current situation:

1. The pins must be inserted manually. This requires a technician to position himself directly below the platforms while they are supported only by the cable. Although such a failure is unlikely, should the cable fail while the technician is inserting or removing the pins, the technician could be seriously injured or killed.
2. The winch is installed in such a position that the cable tends to spool inaccurately which over time causes excessive wear on the cable. This condition could lead to premature catastrophic failure of the cable.

Until now, these 2 conditions have been addressed by frequent examination of the cable and pre-tensioning the cable so that it will spool properly prior to removing the pin. While not an entirely satisfactory solution, this procedural method does maintain an acceptable level of safety.

PHENIX engineering has decided to address these 2 issues with 2 improvements to the “window washer” platform system:

1. A remote actuator to insert and remove the safety pins as required. This requires low voltage wiring (24 volt) to actuator and interlocks to (a) sense the pin position (fully engaged and fully disengaged) (b) to prevent the winch from operating when the pin is engaged.
2. Replacing the existing winch with an autospooling winch that maintains appropriate tension and spooling on the winch. This requires interlocking with the window washer

platforms to prevent spooling further when the window washer platforms are above the pins, and when the all platforms are lowered onto their permanent stops. These interlocks are necessary to prevent damage to the winch and/or winch cable due to excessive or inadequate tension, respectively.

Procedures

All work described herein shall be coordinated and performed by PHENIX technicians, engineers and/or BNL bargaining unit carpenters as appropriate to the task and per bargaining unit contract with BNL. All working personnel shall have appropriate skills and training to accomplish the work described herein. All workers shall have and wear the appropriate personal protective equipment (PPE) for each task.

This procedure describes the steps necessary to install two separate Locking Pin mechanisms, including their associated limit switches, electrical junction boxes, conduit and cable to the PHENIX Experimental Hall west wall. The components will eventually be powered only by low voltage power supplies (12 and 24 volt DC).

PHENIX will supply all components, wire & cable, terminal blocks and junction boxes, except for the interconnecting conduit.

The IR West wall has been pre-marked with locations only for the pin motorized drive units and pin “IN” limit switches. All junction boxes and conduit will be “field run” by the electricians. These units should be secured using at least 5/8 inch Hilti anchors. PHENIX technical staff will advise the CAD electricians with any additional details as the work progresses.

Note: Prior to any work being performed and at all times when work is being performed under any or all of the hoisted platforms, the manual safety pins shall be installed. The only time when work is permitted underneath the platforms while hoisted shall be to replace the manual safety pins with the automatic pins and this only after the pin drives have been mounted and aligned.

- 1) Mount the North Pin mechanism.
- 2) Mount the North Pin “IN” limit switch.
- 3) Mount the South Pin mechanism.
- 4) Mount the South Pin “IN” limit switch.
- 5) Mount the North and South electrical junction boxes.
- 6) Run ½ inch EMT conduit between the new junction boxes and the existing “1900” boxes mounted on the wall.
- 7) Pull in new multi conductor cable between the components and wire them in accordance with the engineer’s drawing.

All of the tasks described above and illustrated on the attached sheet are common worker planned work tasks. Upon completion of the upgrades all workers shall sign this work permit and any “lessons learned” or other appropriate comments and observations concerning this

work shall be noted on the work permit or other sheets which shall then be attached to the work permit. This work permit shall then be closed out.

Window Washer Autospool and Remote pin Removal

Safety Improvement Upgrade
During 2012 Shutdown

Introduction

The ability of the PHENIX experiment to move the West carriage east and west for maintenance and operational purposes allows great flexibility to both optimize the performance of PHENIX detectors and provide convenient access for maintenance and upgrades. This capability requires moveable platforms on the west side of the west carriage and this capability requires the use of a winch. Over the years it has been noted that the current configuration has 2 significant characteristics that could cause an unsafe condition. Currently these conditions are ameliorated by administrative controls, i.e. a written procedure. There are 2 aspects to these controls which are particularly problematic:

1. The winch and cable design is flawed. It does not allow proper spooling of the winch cable which can lead to excessive wear and ultimately premature failure of the cable.
2. When the platforms are in the raised position, they are supported only by the cable. For redundant safety against failure, 2 steel pins are inserted below the platforms in their hoisting tracks to prevent the platforms from falling should a cable failure occur.

The administrative procedures require that the pins be installed whenever the platforms are raised and that the cable be periodically examined for excessive wear and replaced when necessary.

In order to insert and or/ remove the pins, a technician must go under the platforms. This is an unsafe condition, although failure is extremely unlikely if the procedure is followed.

Solution:

PHENIX engineering has decided an engineering control solution to the problems described above, as follows:

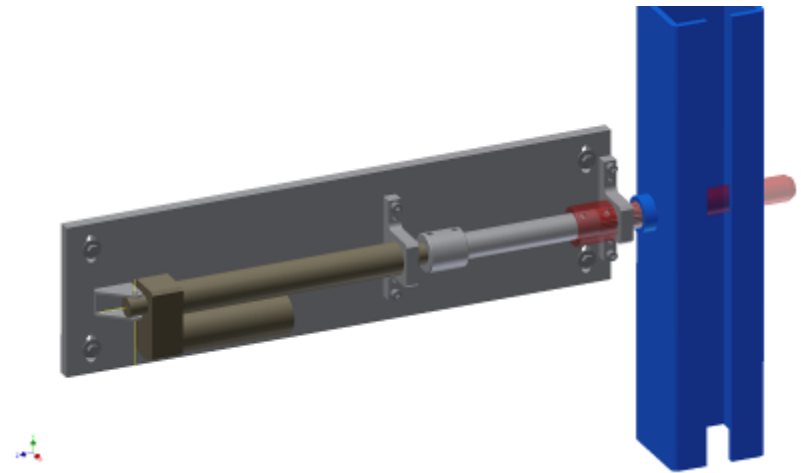
1. Install a remote actuator to insert and remove the safety pins as required. This requires low voltage wiring (24 volt) to actuator and interlocks to (a) sense the pin position (fully engaged and fully disengaged) (b) to prevent the winch from operating when the pin is engaged.
2. Replacing the existing winch with an autospooling winch that maintains appropriate tension and spooling on the winch. This requires interlocking with the window washer platforms to prevent spooling further when the window washer platforms are above the pins, and when the all platforms are lowered onto their permanent stops. These interlocks are necessary to prevent damage to the winch and/or winch cable due to excessive or inadequate tension, respectively.

These solutions are illustrated in the following pages.

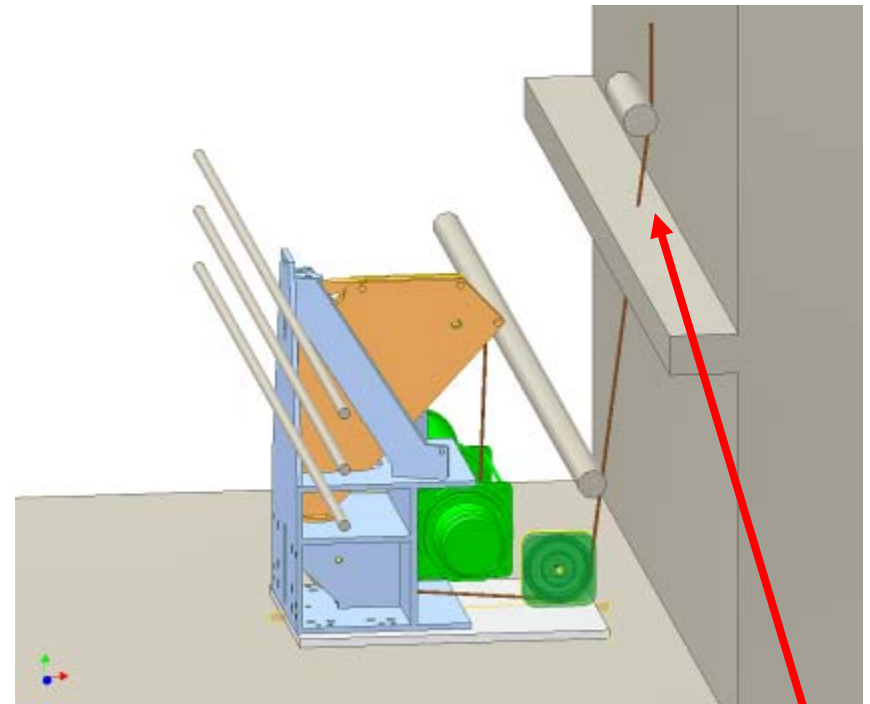
Existing Manual pin insertion/extraction



Automated pin insertion/extraction



Existing Thern winch, without
autospooling, and sharp angle
to roller



Model of new Columbia winch
and auto-spooler. Note cable
tray modification is needed to

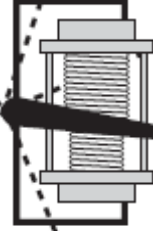
Create perfect line spooling for any winch or hoist.



Auto Advance Line Spoolers eliminate the need for a fixed sheave precisely located in relationship to the drum to achieve proper line spooling.

Auto Advance Line Spoolers work with any size of line and even with differing sizes of line on the same drum to create optimal line spooling. Large diameter sheaves in the Auto Advance Line Spooler ensure the line is not damaged by small radius bends.

Auto Advance Line Spoolers do not require a fixed sheave for proper spooling, so loads can be pulled right up to the drum.



Auto Advance Line Spoolers do not have the parasitic power losses, component timing problems or maintenance requirements associated with typical level wind devices.

Auto Advance Line Spoolers make it possible for an incoming line to move up and down, left and right and rotate 360 degrees or more around the spooler without affecting spooling.

Auto Advance Line Spoolers increase line life and increase user safety by eliminating the dangerous practice of pushing or pulling line by hand in an attempt to make it spool properly.

Without an Auto Advance Line Spooler

A 12" wide drum requires a fixed sheave 20 feet away for proper spooling.



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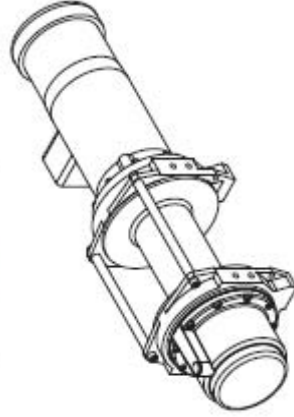
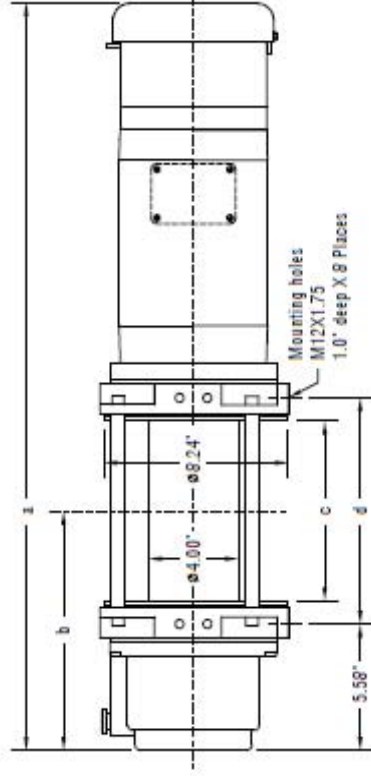
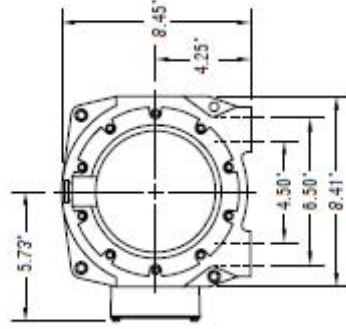
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DIMENSIONAL DATA



Drum Size	Dimensions				Typical Weight	Wire Rope Capacity		
	a ¹	b	c	d		1/4"	5/16"	3/8"
01	33.0"	10.57"	8.0"	10.0"	132 lbs	326'	228'	159'
02	35.0"	11.57"	10.0"	12.0"	135 lbs	407'	285'	198'
03	37.5"	12.82"	12.5"	14.5"	145 lbs	509'	356'	248'

¹ Dimension for 1.5 HP 3Ø 1750 RPM brakemotor shown

PERFORMANCE

Model	Motor		Power Input	Gear Ratio	Calculated Performance			
	HP	RPM	Voltage		First Layer	Mean Drum	Full Drum	
					LBS	FPM	LBS	FPM
HF375	1.0	1700	115/230 230/460	27:1	375	74.2	281	96.3
HF575	1.5	1700	230/460	27:1	575	74.2	421	96.3
HF775	2.0	1700	230/460	27:1	775	74.2	562	96.3
HF1000	1.0	3300	115/230 230/460	164:1	1,000	24.1	780	31.2
HF1500	1.5	3300	115/230 230/460	164:1	1,500	24.1	1,171	31.2
HF2100	2.0	3300	230/460	164:1	2,100	24.1	1,561	31.2
HF2300	1.0	1725	115/230 230/460	164:1	2,300	12.2	1,769	15.9
HF3500	1.5	1725	115/230 230/460	164:1	3,500	12.2	2,653	15.9
HF4700	2.0	1725	230/460	164:1	4,700	12.2	3,538	15.9

Performance based on intermittent duty cycles.

Columbia winches and hoists are available for AC, DC, hydraulic or pneumatic power sources. Special models for any application can be supplied - please contact your distributor for details.

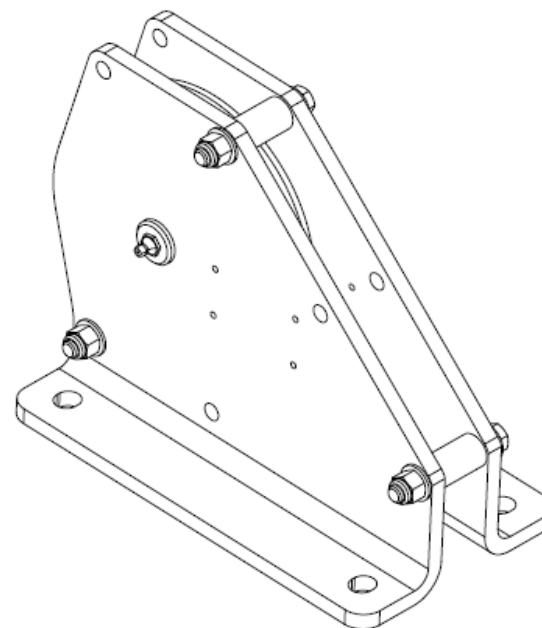
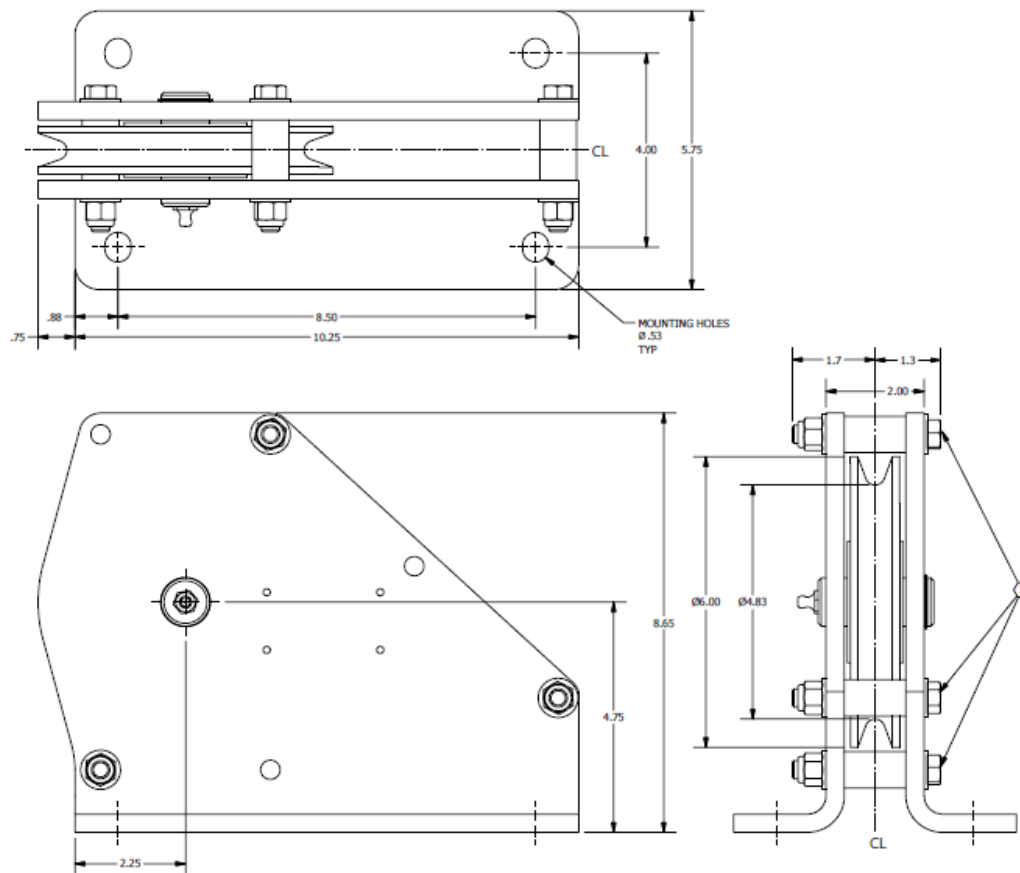
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**Vertical Lead Sheave Dimensions
Ø6" Without Limit Switch**



NOTE:

- ① SIX LOCATIONS ARE PROVIDED FOR BOLT & SPACERS, MOVE AS NECESSARY TO CLEAR LINE. BOLT & SPACERS TO FORM LARGEST TRIANGLE PATTERN FEASIBLE.
2. SHEAVE IS SUITABLE FOR USE WITH Ø5/16" OR Ø3/8" WIRE OR SYNTHETIC ROPE.

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